

## 4.6 Hazard Area 6 - Chestnut Ridge

The Chestnut Ridge watershed consists of approximately 2000 acres immediately south of the main industrial area of the Y-12 National Security Complex and bounded to the south by Bethel Valley Road. This area consists of seven major drainage basins or subwatersheds, each draining south into the Clinch River. The largest of these tributaries is McCoy Branch, which receives drainage from the central portion of the watershed.

A groundwater table divide approximately coincides with the crest of Chestnut Ridge. Shallow groundwater on the south side of the ridge flows southward, primarily discharging to surface streams and springs that drain to the Clinch River. The Knox Group underlies Chestnut Ridge and there is a significant strata-bound, along-strike flow component in the bedrock. Discharge points for intermediate and deep flow are not well known. Groundwater is presumed to flow primarily toward Bear Creek Valley to the north, Bethel Valley to the south, or strike-parallel groundwater flow to Scarboro Creek.

Chestnut Ridge contains a number of waste disposal sites, including inactive hazardous waste sites regulated under RCRA and/or CERCLA, as well as active and inactive nonhazardous solid waste management facilities (industrial and construction landfills) permitted by the TDEC. Several of these facilities have been previously closed under RCRA regulations, while others continue to be actively operated. Only one of these facilities, the Chestnut Ridge Security Pits, has been identified as a source of groundwater contamination. The VOC plume at this site contains primarily tetrachloroethene and 1,1,1-trichloroethane, with concentrations up to 0.5 mg/L near the source. Discharge points for this plume are not known; however, these contaminants have not been identified in springs on the south side of Chestnut Ridge even though a tracer test has indicated a connection to springs in the Scarboro Creek water gap, indicating a potential along-strike migration pathway.

Remedial action planning for the Chestnut Ridge watershed is in a relatively early stage. All completed actions for Chestnut Ridge have been single project decisions to address known or potential sources of releases. Previous CERCLA RODs have been issued for the UNC Disposal Site (1991), the Kerr Hollow Quarry (1995), and the Filled Coal Ash Pond/Upper McCoy Branch remedial actions (1996). A CERCLA Record of Decision to address remaining sources of contamination is expected to be completed in FY 2009. A baseline ecological risk assessment has been completed only for the Filled Coal Ash Pond; ecological impacts in the remainder of the watershed will be evaluated in the future ROD. A RCRA post-closure permit for the Chestnut Ridge hydrogeologic regime currently governs the majority of environmental monitoring activities for legacy waste management units within the administrative watershed.

### Current State Chestnut Ridge:

Contaminant sources and facilities in Chestnut Ridge include the following:

- RCRA-regulated solid waste management units include the East Chestnut Ridge Waste Pile, Contaminated Soils Storage Area and Storm Sewer Sediment Drying Facility; contaminants of concern at these sites include mercury, uranium, and PCBs.
- RCRA/CERCLA-integrated units include the Chestnut Ridge Security Pits, Kerr Hollow Quarry (RCRA closure and CERCLA remedial action complete 1995), and the Chestnut Ridge Sediment Disposal Basin. Contaminants of concern include cadmium, chromium, lead, nickel, mercury, uranium, carbon tetrachloride, and chloroform.
- Nonhazardous solid waste management facilities permitted under TDEC solid waste regulations include three Class 2 (industrial) landfills, designated Landfill II (closed), IV, and V; and two Class 4 (construction/ demolition) landfills, designated Landfill VI and VII.
- Additional non-RCRA-regulated sites previously addressed under the CERCLA program include the United Nuclear Corporation site, the Filled Coal Ash Pond, and Rogers Quarry. Non-RCRA-regulated sites remaining to be addressed under CERCLA include the Chestnut Ridge Borrow Area Waste Pile, the Mercury-Contaminated Gully Soil Pile, the Criticality Testing Facility, and the Uranium Oxide Vaults. These sites contain a variety of contaminants of concern, including nitrates, arsenic, copper, lead, zinc, mercury, uranium and fly ash.

#### Life-Cycle Baseline Plan for Chestnut Ridge:

Under the current baseline, no near-term opportunities for major risk reduction at Chestnut Ridge have been identified. Remedial actions are in relatively early stages of planning, but the overall remediation program is scheduled for completion by 2015:

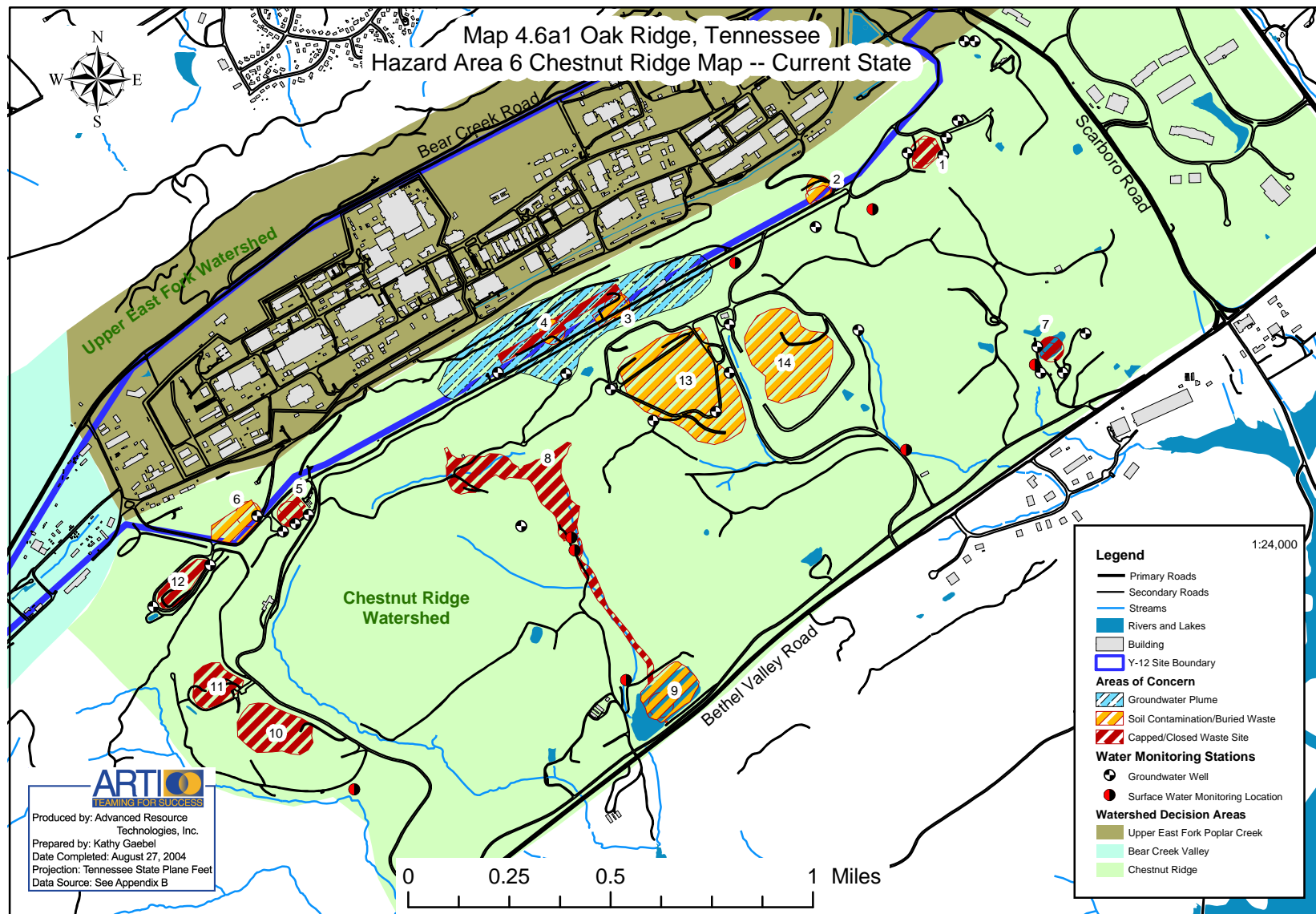
- While the remedy at Chestnut Ridge is in a preliminary planning stage, potential remedial actions include a combination of excavation for offsite disposal or closure-in-place of buried materials that pose an unacceptable risk to future workers or the environment. Institutional controls will be maintained under a long-term stewardship program to control future land use, to restrict access to capped waste disposal areas, and to prohibit onsite use of groundwater, as necessary for protection of human health and the environment.

#### End State Vision for Chestnut Ridge:

Current baseline plans for Chestnut Ridge include cleanup actions designed to support the planned industrial end use of the site, and provide an acceptably low level of risk to future DOE/NNSA workers. Remediation criteria are expected to be risk-based and specific to the planned end use of the site. However, remediation planning for this hazard area is not sufficiently developed to permit a meaningful analysis of potential variances.

Maps of the Chestnut Ridge watershed under current and end state conditions are provided in Figures 4.6a1 and 4.6b1. Conceptual site models under current state and end state conditions are illustrated in Figures 4.6a2 and 4.6b2, respectively.

Map 4.6a1 Oak Ridge, Tennessee  
Hazard Area 6 Chestnut Ridge Map -- Current State



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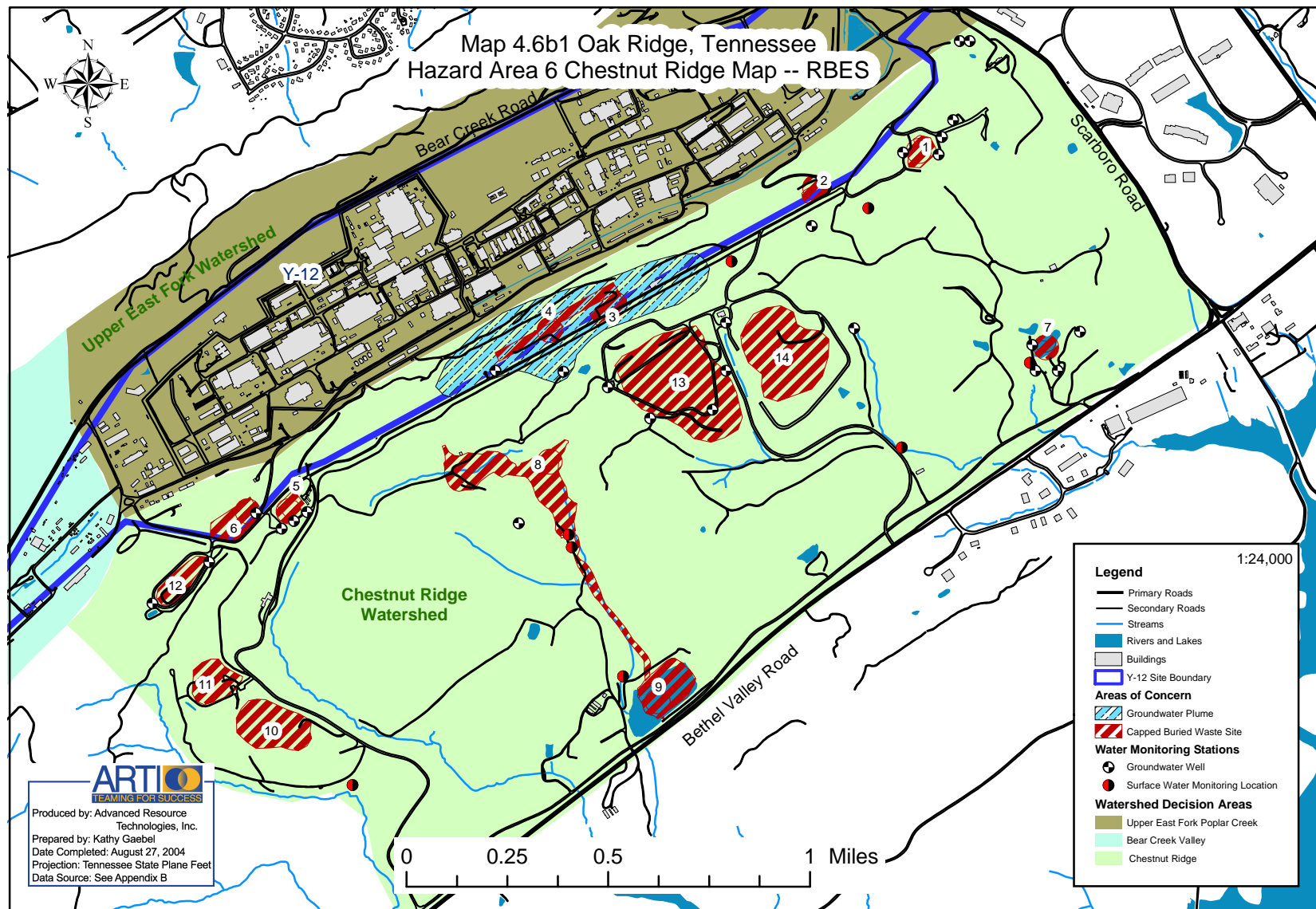
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Prepared by: Kathy Gaebel  
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## Figure 4.6a1 Continued

### Notes for Chestnut Ridge Watershed current-state map:

1. Chestnut Ridge Sediment Disposal Basin – Closed-in-place under RCRA in 1989 via multi-layer cap.
2. East Chestnut Ridge Waste Pile – Waste pile managed under RCRA interim status requirements.
3. Temporary Storage Area – Contains contaminated roofing material covered by 3-foot soil cover.
4. Chestnut Ridge Security Pits – Consists of 7 waste disposal trenches in two individual areas and six auger holes used for disposal of classified wastes; closed under RCRA in 1990 via multi-layer caps.
5. United Nuclear Corporation (UNC) Landfill – Closed under CERCLA ROD using modified RCRA cap in 1992.
6. Chestnut Ridge Mercury Gully Soil Pile – Inactive, non-RCRA-permitted waste soil pile.
7. Kerr Hollow Quarry – Abandoned rock quarry previously used for waste treatment and disposal; closure completed in 1993 using remotely-operated underwater vehicle to remove wastes from the quarry floor.
8. Filled Coal Ash Pond – A 8.5 acre surface impoundment and earthen retention dam, used as a settling basin for coal ash from the Y-12 Steam Plant. CERCLA remedial action completed in 1997 (Chestnut Ridge Operable Unit 2), included upgrading and stabilizing the dam and constructing a wetlands area below the dam.
9. Rogers Quarry – Inactive surface impoundment, formerly a rock quarry, used for disposal of Y-12 wastes.
10. Sanitary Landfill 2 – Closed landfill previously used for disposal of non-hazardous sanitary waste. This facility managed only non-hazardous sanitary waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.
11. Sanitary Landfill 6 - Closed landfill previously used for disposal of non-hazardous construction and demolition wastes. This facility managed only non-hazardous construction and demolition waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.
12. Sanitary Landfill 4 – Active landfill used for disposal of non-hazardous, classified sanitary and industrial wastes. This facility managed only non-hazardous waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.
13. Industrial Landfill 5 – Active landfill used for disposal of non-hazardous sanitary and industrial wastes. This facility manages only non-hazardous sanitary and industrial waste and is included on this map only for purposes of completeness, but is not expected to contain significant hazards.
14. Industrial Landfill 7 – Active landfill used for disposal of non-hazardous construction and demolition wastes. This facility manages only non-hazardous construction and demolition waste and is included on this map only for purposes of completeness but is not expected to contain significant hazards.

# Map 4.6b1 Oak Ridge, Tennessee Hazard Area 6 Chestnut Ridge Map -- RBES



## Figure 4.6b1 Continued

### Notes for Chestnut Ridge Watershed End State map:

1. Chestnut Ridge Sediment Disposal Basin – Closed-in-place under RCRA in 1989 via multi-layer cap.
2. East Chestnut Ridge Waste Pile – Waste pile managed under RCRA interim status requirements - will be closed in place.
3. Temporary Storage Area – Contains contaminated roofing material covered by 3-foot soil cover - will be closed in place.
4. Chestnut Ridge Security Pits – Consists of 7 waste disposal trenches in two individual areas and six auger holes used for disposal of classified wastes; closed under RCRA in 1990 via multi-layer caps.
5. United Nuclear Corporation (UNC) Landfill – Closed under CERCLA ROD using modified RCRA cap in 1992.
6. Chestnut Ridge Mercury Gully Soil Pile – Inactive, non-RCRA-permitted waste soil pile - will be closed in place.
7. Kerr Hollow Quarry – Abandoned rock quarry previously used for waste treatment and disposal; closure completed in 1993 using remotely-operated underwater vehicle to remove wastes from the quarry floor.
8. Filled Coal Ash Pond – A 8.5 acre surface impoundment and earthen retention dam, used as a settling basin for coal ash from the Y-12 Steam Plant. CERCLA remedial action completed in 1997 (Chestnut Ridge Operable Unit 2), included upgrading and stabilizing the dam and constructing a wetlands area below the dam.
9. Rogers Quarry – Inactive surface impoundment, formerly a rock quarry, used for disposal of Y-12 wastes - will be closed in place.
10. Sanitary Landfill 2 – Closed landfill previously used for disposal of non-hazardous sanitary waste. This facility managed only non-hazardous sanitary waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.
11. Sanitary Landfill 6 - Closed landfill previously used for disposal of non-hazardous construction and demolition wastes. This facility managed only non-hazardous construction and demolition waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.
12. Sanitary Landfill 4 – Landfill used for disposal of non-hazardous, classified sanitary and industrial wastes – will be closed in place. This facility managed only non-hazardous sanitary and industrial waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.
13. Industrial Landfill 5 – Landfill used for disposal of non-hazardous sanitary and industrial wastes - will be closed in place. This facility managed only non-hazardous sanitary and industrial waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.
14. Industrial Landfill 7 – Landfill used for disposal of non-hazardous construction and demolition wastes - will be closed in place. This facility managed only non-hazardous construction and demolition waste and is included on this map only for purposes of completeness, but is not known to contain significant hazards.

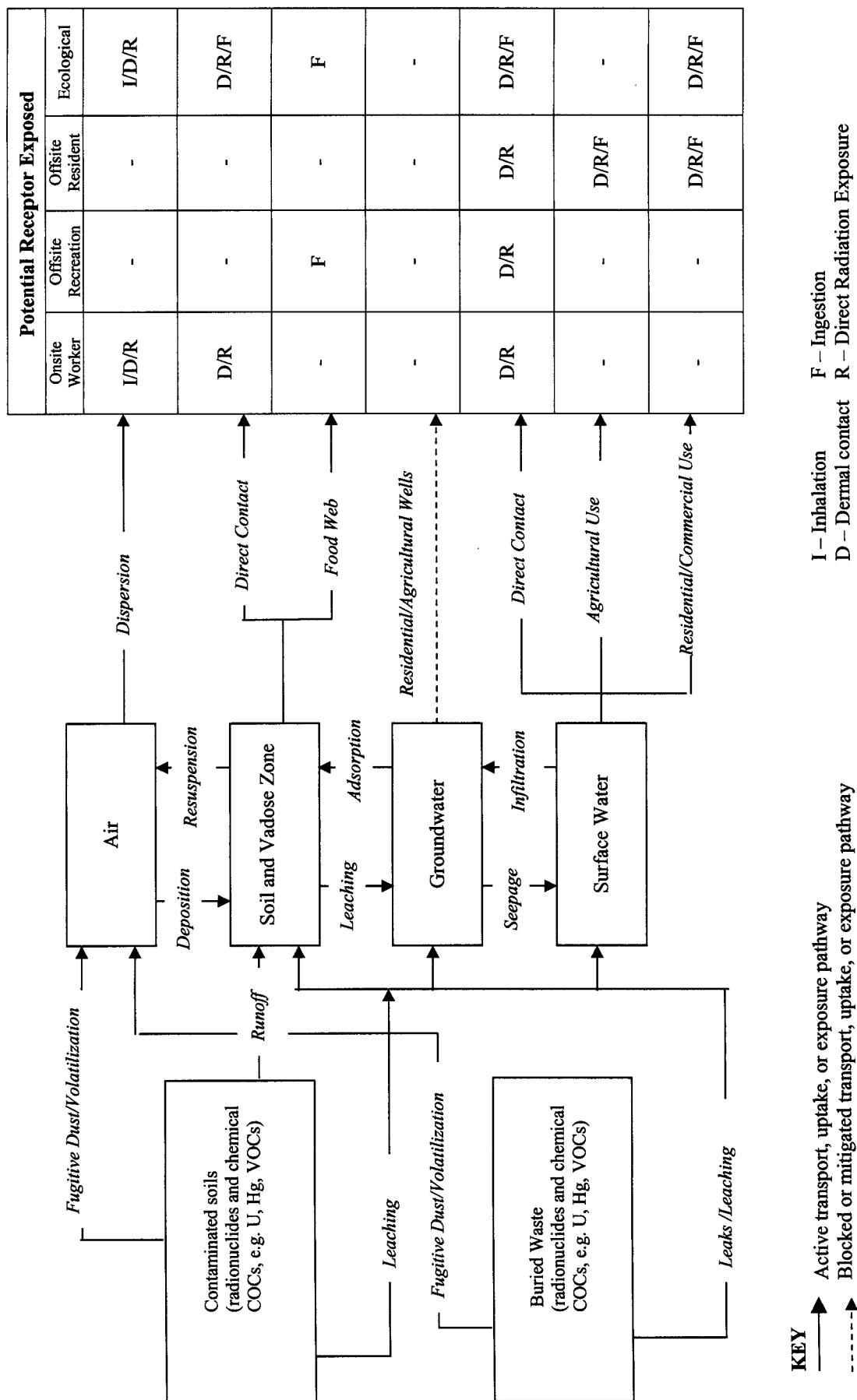


Figure 4.6a2, Conceptual Site Model – Hazard Area 6, Chestnut Ridge Watershed – Current State

**Narrative:**

**Contaminant Sources:**

Under current state conditions, primary sources include waste burial sites and landfills, most of which were previously permitted and closed under RCRA regulations and/or state solid waste regulations. Surface and subsurface soils also may contain contaminants of concern in concentrations above site remediation levels (which have yet to be established). Contaminants of concern have not been fully characterized, but are likely to include radionuclides (primarily uranium), metals (Hg), VOCs, and PCBs.

**Current State Exposure Pathways and Receptors:**

Under current conditions, potentially complete exposure pathways for onsite workers include: inhalation of particulates or volatiles; and direct exposure to radiation in soils, waste and surface water. Potentially complete exposure pathways to off-site recreationists include direct contact with surface water and ingestion of fish. Ecological receptors potentially may be exposed to contaminants in air, soil, surface water and the food chain. Potentially complete exposure pathways to offsite residents include direct contact with surface water exiting the ORR, fish ingestion, and use of contaminated surface water for irrigation of home gardens. There is no current use of groundwater or surface water at Chestnut Ridge for residential, commercial, or agricultural purposes.



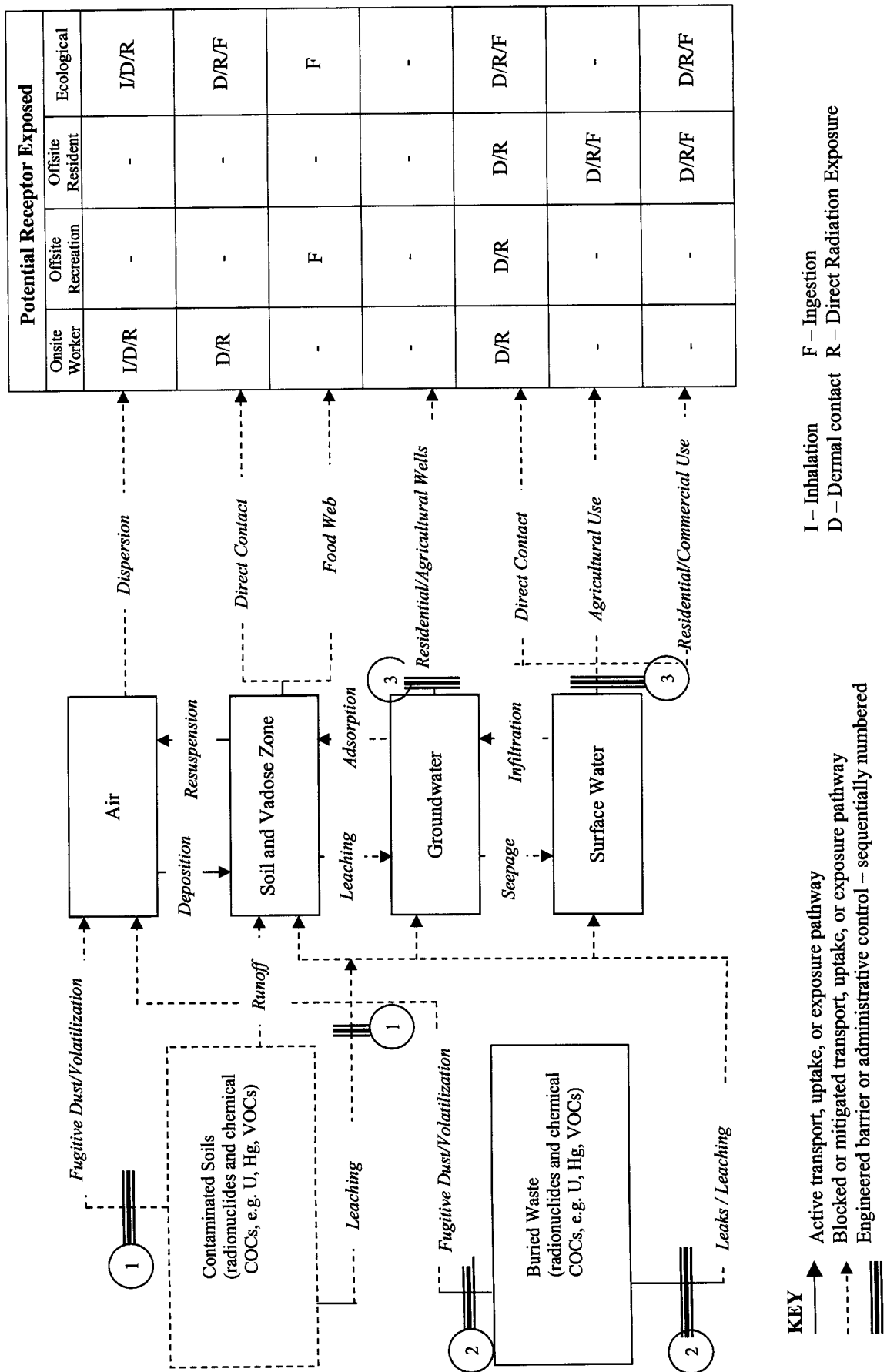


Figure 4.6b2, Conceptual Site Model – Hazard Area 6, Chestnut Ridge Watershed – End State

### **Narrative:**

### **Contaminant Sources:**

Characterization and remediation planning for Chestnut Ridge is at the earliest stage of any area within the ORR. Under both current life-cycle baseline and end state conditions, this area will remain under DOE/NNSA control. This area, located immediately south from the Y-12 main industrial complex, is relatively undeveloped and has been used historically for waste management, with a number of solid waste landfills and classified waste disposal sites. No specific needs for future development of this area have been identified, and it is likely to remain relatively undeveloped and serve a primary function as a buffer area around the Y-12 National Security Complex. Most of the existing landfills and waste burial sites have been or are expected to be closed-in-place, and will require institutional controls in perpetuity. Remediation criteria for contaminants of concern in soil and other media have yet to be determined, but it is expected that such criteria will be risk-based and that any residual contamination below these criteria that will remain in soils, sediments, surface water and groundwater will not pose an unacceptable risk to future DOE/NNSA industrial workers. Institutional controls will include restrictions on future groundwater use.

### **End State Barriers/Interventions:**

The steps taken to mitigate or remove these hazards are as follows:

1. Contaminated soils containing contaminants of concern above (yet to be determined) remediation criteria will be removed for offsite disposal. Residual contaminant levels will be below levels of concern for fugitive dust emissions or direct radiation exposure.
2. Waste burial areas and landfills will be closed-in-place via capping. Some facilities have previously been closed-in-place under RCRA, with multi-layer caps currently in place. Alternatively, some wastes may be excavated for disposal at the EMWMF disposal facility in adjacent Bear Creek Valley, particularly if RCRA post-closure monitoring indicates inadequate performance of containment systems. Residual contamination levels will be below levels of concern for direct radiation exposure or fugitive dust emissions/volatilization.
3. Future land use is restricted to industrial use, with prohibitions on groundwater and surface water use. Long-term stewardship and institutional controls will ensure continuing protectiveness of the remedy. Surveillance and maintenance will include monitoring of surface water and groundwater, with periodic maintenance and replacement of groundwater wells and ongoing maintenance of capped areas as required.

Since contaminants will remain on site above levels suitable for unlimited use and unrestricted exposure, a statutory review will be conducted at least every five years to ensure that the remedy continues to be protective of human health and the environment. These reviews will evaluate any failure of remedial measures and the sustainability of the remedy. Potential failure modes could include breaches of capping/containment systems, unauthorized use of groundwater, or unauthorized land use.

**Figure 4.6b2, Conceptual Site Model – Hazard Area 6, Chestnut Ridge Watershed – End State**

The current baseline and end state scenarios for Chestnut Ridge remedial actions are considered to be identical. However, remedial action planning for this area is at a very preliminary stage. Some of the waste management facilities in Chestnut Ridge previously have been closed in place under RCRA, and it is assumed that most areas of buried wastes generally will be managed in place through capping. The containment system for capped areas will require periodic maintenance and repair to minimize the potential for failure. Groundwater monitoring wells will require periodic maintenance and replacement at longer (assumed ~30-year) intervals. A long-term stewardship program will ensure the continuing protectiveness of the remedy, including continuing surveillance and maintenance. Since contaminants will remain on site above levels suitable for unlimited use and unrestricted exposure, a statutory review will be conducted at least every five years to ensure that the remedy continues to be protective of human health and the environment. The NNSA will retain ownership of the Chestnut Ridge watershed and the remainder of the Y-12 National Security Complex for the foreseeable future.